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POPULATION GROWTH IN THE WEST AND ITS IMPACT
ON NATURAL RESOURCES¹

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Let this discussion commence from a perspective of the rate and magnitude of western population growth in the recent past. Tables I-V summarize some of the most relevant data. These data are the basis for several generalizations on western population growth which are essential background for the further considerations implied in the title of this paper. After stating these generalizations, the paper proceeds to some of the interrelations between population growth and economic expansion in the past and concludes with comments on the prospects of the future.

I. GENERALIZATIONS FROM THE DEMOGRAPHIC DATA

1. Although the populations of the eleven western states and of the Mountain and Pacific regions have grown rapidly, and at rates considerably in excess of those of the nation, the state-to-state differences within the West are very large, ranging from many times the national average to about half the national average.

2. In the first four years of this decade, a rapid rate of western growth has continued, but in relation to the national rate, it has diminished. Whereas from 1940-1950, the West grew 2.8 times as fast as the nation at large, in the past four years this ratio has dropped to 2.2.

3. Particularly notable is the suggestion in the data that the areas of rapid growth within the region may have shifted in the present decade. Growth rates in the Pacific Region—in Washington and Oregon particularly—have declined sharply. Growth ratios of the Mountain Region have moved upward, though not uniformly and not sharply, except in Arizona and Nevada.

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4. Even though westerners are not noted for infertility, it is true that our outstanding growth rates are attained mainly by large net human import balances. The ratios to be found in table III show the role of net migration. Note the changes of the last four years as compared with the preceding decade. Whereas Washington and Oregon gained 650,000 by net migration in 1940-1950, these states gained only 26,000 in the first three years of this decade. In contrast, the three-year gains in New Mexico and Arizona were not far behind the entire preceding decade, and the three-year gain in Nevada was already ahead of it.

5. Regional and state population growth in the recent past and in the prospective future is compounded out of the forces that influence national fertility and those that impel internal migration. Death rates, though declining gradually, are substantially invariant from year to year and the role of immigration has become minimal, thus leaving fertility as the almost exclusive determinant of national population growth. What is noteworthy is that even after two important erstwhile population variants have been nullified, the future population of the nation still remains uncertain by reason of unstable fertility. And for states and regions, particularly those of the West, future populations are much more highly uncertain because of the complexity of forces that influence migration.

6. Our present high level fertility is now being accepted as an unexpected reversal of a long-time downward trend. As the data in table IV show, earlier marriages and the bearing of children earlier in the marriage are responsible for the marked upturn in total births and in the crude birth rate since 1940. But the evidence does not yet demonstrate an upturn in the size of completed families. Women 20-34 years of age in 1952 had borne significantly more children than had their counterpart generation of 1940. If the fertility level of this generation is sustained through the normal age range of child bearing, this will clearly demonstrate at least a temporary upward revision in the concept of desirable family size, otherwise only that childbearing has been shifted to an earlier age. For evidence that is at all satisfactory on this point, we shall have to be patient until the end of this decade.

7. Within the limits of plausible assumptions as to fertility, the future national population can be projected, and with some degree of intellectual comfort to the projector. As for regional and state populations in the West, similar projections are ventured occasionally, but usually with obvious discomfort, for the forces and occurrences that impel western migration are not readily predictable. The largest movements to California, for example, have been associated with times of unusual prosperity and with the two world wars. Unless one can predict wars and prosperity, he would likely not do well at predicting migration to California, and quite possibly not even then.

TABLE I

*Growth of Population in Western States, Other Regions, and United States
1940 to 1950 and 1950 to 1954*

(Civilian population in thousands)

Area	1940 to 1950			1950 to 1954		
	April 1, 1950	April 1, 1940	Net Increase	July 1, 1954	Net Increase from April 1, 1950	Per Cent
	Number	Number	Per Cent	Number	Number	Number
Washington.....	2,317	1,722	59.4	2,459	142	6.1
Oregon.....	1,519	1,089	430	1,634	116	7.6
California.....	10,413	6,858	3,555	12,213	1,800	17.2
Pacific.....	14,248	9,669	4,579	16,306	2,058	14.4
Montana.....	589	559	30	624	35	5.9
Idaho.....	588	559	64	611	23	3.9
Wyoming.....	282	246	36	302	20	7.2
Colorado.....	1,307	1,120	187	1,408	101	7.7
New Mexico.....	668	532	136	752	85	12.7
Arizona.....	742	498	244	974	232	31.3
Utah.....	687	550	137	753	65	9.5
Nevada.....	157	110	47	209	52	33.1
Mountain.....	5,021	4,140	881	5,634	613	12.2
West.....	19,269	13,808	5,460	21,940	2,671	13.9
South.....	46,653	41,543	5,109	49,214	2,561	5.5
North Central.....	44,369	40,110	4,258	46,901	2,533	5.7
Northeast.....	39,344	35,929	3,415	41,029	1,686	4.3
United States.....	149,634	131,391	18,242	159,084	9,450	6.3

Source: U. S. Bureau of the Census, *Current Population Reports*, Series P-25, Nos. 72 and 104.

TABLE II

*Rates of Population Growth in Western States and in Regions
as Ratios to National Rates of Population Growth
1940 to 1950 and 1950 to 1954^a*

Area	1940 to 1950	1950 to 1954
Washington.....	2.48	.97
Oregon.....	2.84	1.21
California.....	3.73	2.72
Pacific.....	3.41	2.29
Montana.....	.40	.94
Idaho.....	.87	.62
Wyoming.....	1.04	1.14
Colorado.....	1.20	1.22
New Mexico.....	1.84	2.02
Arizona.....	3.53	4.97
Utah.....	1.80	1.51
Nevada.....	3.08	5.25
Mountain.....	1.53	1.94
West.....	2.84	2.21
South.....	.88	.87
North Central.....	.76	.90
Northeast.....	.68	.68
United States.....	1.00	1.00

a. Based on data in Table I.

II. POPULATION GROWTH AND ECONOMIC EXPANSION

For rapid population growth based mainly on migration to be sustained, there must be proportionate economic expansion. Otherwise, per-capita incomes will decline and thereby, sooner or later, bring the migration to a halt. If it were true that people lived directly on the yield of natural resources in the area of resettlement, then only sparsely occupied frontier communities could absorb additional population and still avoid the adversity of declining incomes. In so uncomplicated a world, impacts of rapid population growth on natural resources would at some stage become all too obvious. But modern economies, particularly those of the western states, are based upon technologies and institutions that obscure the relations between people and basic natural resources; they have (or at least seem to have) great flexibility and versatility. For the welfare of people, these are indeed fortunate attributes; for the analyst who seeks full and reliable knowledge of man in relation to his physical environment, these attributes contain the seeds of frustration and confusion.

During the three decades for which statistics are available, most of the western states have enjoyed per-capita incomes above the national average.

Large in-migration has had little, if any, adverse effect. In California where the volume of in-migration has been so extraordinary, the income differential has apparently narrowed somewhat but still stands at 20-25 per cent above the national average. For a state that was already well settled and populated to grow by one half in a decade and still maintain most of its premium income position, as was true of California 1940-1950, is something of a feat. For the booster, it is the happy motivation for newer and more laudatory slogans; for the scholar, it poses the challenging obligation to find out how it was accomplished. If we can know something of the economic expansion that is concurrent with rapid population growth, we may therefrom also derive some assistance in knowing its impact on natural resources.

Inasmuch as different states and even areas within states respond differently in the expansionary process, it seems unwise to undertake this inquiry for the western region as a single aggregate. Furthermore, neither the time nor the required analyses are available to permit this inquiry being carried into all states of the West. Accordingly, for this section of my topic, I shall

TABLE III
*Net Civilian Migration and Ratios of Net Migration to
Natural Increase—1940-1950 and 1950-1953*

Area	Net Civilian Migration (Thousands of persons)		Ratios of Migration to Natural Increase	
	April 1, 1940 to April 1, 1950	April 1, 1950 to July 1, 1953	April 1, 1940 to April 1, 1950	April 1, 1950 to July 1, 1953
Washington.....	354	3	1.40	.03
Oregon.....	300	23	2.05	.29
California.....	2,588	977	2.51	1.85
Pacific.....	3,243	1,004	2.27	1.39
Montana.....	— 34	— 4	— .47	— .12
Idaho.....	— 20	— 18	— .22	— .47
Wyoming.....	— 7	— 2	— .17	.11
Colorado.....	39	11	.24	.14
New Mexico.....	12	8	.09	.13
Arizona.....	138	122	1.20	2.07
Utah.....	14	— 2	.11	— .34
Nevada.....	33	36	2.06	4.50
Mountain.....	174	150	.23	.42
West.....	3,417	1,154	1.56	1.07
South.....	— 2,017	— 522	— .27	— .18
North Central.....	50	158	.01	.07
Northeast.....	615	202	.19	.14
United States.....	1,976	992	.11	.13

Source: Basic data from U. S. Bureau of the Census, *Current Population Reports*, Series P-25, Nos. 72 and 97.

consider only California. A very recent book by Dr. Margaret S. Gordon, *Employment Expansion and Population Growth, the California Experience 1900-1950*, serves excellently as a basic reference. Additionally, I have drawn upon a chapter by myself on the growth and development of California agriculture which is to appear in a forthcoming book on the California population, sponsored by the Haynes Foundation.

California migration and economic growth are a cobweb of cause and effect relations. Initial movements were provoked by pre-existing economic attractions. For sure, the initiating influence to the forty-niners was a pre-existing attraction. But before very long, people began to realize that it was just as profitable and far more comfortable to mine the miners. And so it has been through the decades. Epochs of migration have been compounded

TABLE IV
Fertility of the National Population

A. Births and Birth Rates			B. Marriage Rate			
Period	No. of Births (Millions)	Crude Birth Rate	Age Group	Per Cent of Females Married		Pct. Increase in Rate 1940-1953
				1953	1940	
1950-1953	10.6	24.8	14-19 years	13.8	9.8	41
1945-1949	17.4	24.1	20-24 years	69.1	51.3	35
1940-1944	14.3	21.1	25-29 years	85.6	74.1	16
1935-1939	12.1	18.8	30-34 years	88.0	80.4	9
1930-1934	12.3	19.7	35-44 years	85.4	81.0	5
1925-1929	13.8	23.2	45-54 years	78.0	76.0	3
1920-1924	14.8	26.8	55-64 years	63.9	63.0	1
1915-1919	14.6	28.4	65-74 years	46.9	41.6	13
1910-1914	14.3	29.8	75 and over	20.0	17.8	12
			Total, 14 and over	66.9	59.5	12
C. Number Children Ever Born per 1,000 Women			D. Number Children Ever Born per 1,000 Women Ever Married			
Age Group	1952	1940	Per Cent Increase 1940-1952	1952	1940	Per Cent Increase 1940-1952
15-19 years.....	98	68	44.1	572	567	0.9
20-24 years.....	836	513	63.0	1,187	969	22.5
25-29 years.....	1,527	1,090	40.1	1,742	1,408	23.7
30-34 years.....	1,943	1,613	20.5	2,130	1,888	12.8
35-39 years.....	2,112	2,095	0.8	2,293	2,357	- 2.7
40-44 years.....	2,169	2,478	-12.5	2,346	2,740	-14.4
45-49 years.....	2,172	2,735	-20.6	2,352	2,993	-21.4
50 years and over.....	2,707	3,014	-10.2	2,937	3,315	-11.4

Source: U. S. Bureau of the Census, *Current Population Reports*, Series P-25, No. 78; Series P-20, Nos. 46 and 50.

out of the initiating occurrences and out of the self-generating forces inherent in an expanding population. In general, it may be said that the initiating developments have tended to be more intimately related to natural resources than have the subsequent service industries that were based on the needs of the population. But even this point is clearer in theory than in fact; if it were not ultimately so, then a migrating population could settle anywhere and prosper merely by rendering services unto itself. Yet the resources serving to initiate California's migrations extend considerably outside the usual inventory. Shipbuilding and aircraft manufacture are two of the largest increments of economic activity the state has ever experienced. But the resource base of these industries is not readily identified. For ships, ports on the Pacific were undeniably useful but the potency of the state's politicians was perhaps just as fruitful a resource. For aircraft manufacture, temperature, humidity, the spacing of rains, and the once-blue skies of the California southland were probably the outstanding attributes. Thus, many characteristics of climate and topography, together with whatever spell of magic it was that created Hollywood, must be listed along with gold, oil, forests, and fertile land in California's inventory of resources.

Only in the very first years of the American epoch did agriculture and the extractive industries occupy the major portion of the population. Through the years, employment in these industries has not kept pace with population growth. In consequence, their relative position has consistently receded until they now have less than one tenth of all gainfully employed workers. Meanwhile, such industries as construction, manufacturing, trade, and public administration have expanded at least in proportion with population growth. By 1950, construction occupied about as many workers as did agriculture; distribution and service in total were approximately nine times the size of agriculture.

TABLE V

The National Population to 1975—Possible Maximum and Minimum Projections

Year	A Series*		D Series†	
	Number (Millions)	Percentage Increase Over 1950	Number (Millions)	Percentage Increase Over 1950
1955.....	164.8	8.6	164.4	8.4
1960.....	177.4	17.0	173.8	14.6
1965.....	189.9	25.2	180.9	19.3
1970.....	204.2	34.6	189.1	24.7
1975.....	221.0	45.7	198.6	31.0

* Assumes age-specific fertility rates of 1950-1953 will continue through to 1975.

† Assumes age-specific fertility rates will decline linearly from 1950-1953 levels to 1940 levels by 1960 and thereafter remain at approximately the 1940 level until 1975.

Source: U. S. Bureau of the Census, *Current Population Reports*, Series P-25, No. 78.

Those whose thinking runs in fundamentalist terms tend to assume that rapid growth to a 12 $\frac{1}{4}$ -million population must have brought severe impacts upon California's agriculture and its farming resources. However, my interpretation of the evidence leads to a different conclusion. This conclusion derives basically from the fact that in volume and composition of output, California's agriculture has always been primarily responsive to national and international markets rather than to state or western markets. The majority of the state's farming resources have always been used in producing export specialties. With respect to the use of these resources, growth in the size and buying power of the national population has been of major importance, but the proportion of the national population living in California or in the West has not been of much immediate consequence. With the growing of the state population, some of the commodities have shifted from the surplus to the deficit category; this is particularly true of cereals and livestock products. Although profitability in these commodities was enhanced by larger local markets, it still was not sufficient, generally speaking, to induce resources away from the export specialties. Consequently, the state has been and remains one of agricultural surpluses and deficits, with no apparent strong influences toward self-sufficiency.

It is therefore doubtful that the agriculture of California would have been much different from what it is had the state population remained at a fraction of its present magnitude, providing that national and international markets had been as they have. The relevant point of this speculation is that it indicates that the impact of population on agricultural resources, in an economy of well-developed exchange and transport facilities, is more a matter of the national than of state or regional populations.

It is perhaps worth noting the extent to which opportunities in agriculture have been an initiating influence in attracting migrants to California. The historical record of the first two decades of the American regime, 1850-1870, is well marked with expression of lament that the large land holdings were not being divided rapidly into family farms. Immediately following the completion of the transcontinental railroad in 1869, several immigration societies were organized for the principal purpose of stimulating the movement of small farm operators to California. The campaigns that were launched in 1870s and 1880s lacked not in color or versatility of approach. Though they may have had a hand in stimulating general migration, they produced little if any acceleration in the growth of family farming. By 1900, the theme of opportunities for family farmers was largely abandoned and replaced by equally unsuccessful appeals to hired farm hands. The combination of these two failures left a structure of agriculture that was heavily dependent on recurrent infusions of labor from foreign or external sources. Chinese, Japanese, Filipinos, East Indians, Mexicans, and the episodic Okies and Arkies have all had their roles upon this stage. As each infusion lost

itself into the total mix of the state's economy, a new one has been sought. In these indirect and somewhat obscured ways, the natural resources of agriculture have perhaps had a greater impact on California's population than has its population upon agricultural resources.

Viewing the state in terms of its aggregate economic growth, or in terms of the development of its principal industries, it is difficult to identify intimate and unobscured relationships to natural resources. Admittedly, within a narrower focus, one can find ghost towns in the mining areas, oil wells that have ceased to flow, forests that no longer hold saw timber, and farm lands for which there is not sufficient irrigation water. Certainly these are impacts—and ostensibly devastating impacts—of population upon natural resources. But whether they are impacts inherently associated with population growth, either state, regional, or national, is another matter. Generally speaking, it seems to me to be more a matter of policy and attitude than of people *per se*. Certainly, the huge mounds of gravel and boulders left in the wake of gold dredgers were not induced by the needs of a growing population but by a most dubious national gold-price policy. This, I admit, is not a particularly instructive example, for gold has very little usefulness, whether diffused in the earth's crust or peacefully resting in the air-conditioned and well-guarded vaults of Fort Knox. But on the other hand, the burden to taxpayers of acquiring and guarding the gold, and the havoc wrought upon streams and meadows in digging it out, are not only clear net losses to society, but also, unfortunately, crushing testimony of man's propensity to concede his resources to political chicanery just as readily as to fundamental needs. Looking at more useful resources, such as timber stands and oil deposits, where the issues are vastly more complex by reason of the conflict between present and future use, one still cannot avoid the conclusion that the manner of use derives less from inherent needs of a growing population than of the policies and attitudes with which we have approached the resource. Certainly, this is true for the renewable resources. As for the nonrenewable deposits of coal, oil, and minerals, there may be nothing morally wrong in removing in a few short years the accumulations of the geologic ages, provided that the contemporary society is fully conscious of the risk taken that, as depletion occurs, fully satisfactory substitutes may not be forthcoming. In any event, there is a considerable range of alternatives which govern the rate of use, quite apart from the size of the population.

III. APPRAISAL AND PROSPECT

What can be said in appraisal of economic expansion in the West and its relation to natural resources? Truthfully, this is a point that I find highly confounding. As an economic accomplishment, it seems to demonstrate (or to *redemonstrate*) that the greatest natural resource known to

man is his own resourcefulness. Evidence of this is found in two directions: first, in the imaginative ability to perceive resource values in obscure forms and combinations; second, in developing so geographically remote an area in close functional relationship with the national economy.

Yet in terms of other values, this expansion may not be seen as a thing of beauty or of high ethical order. The western Indian fared no better than did his counterpart on the Atlantic 150 years before. Native plants and animals have fallen before the rapacious hand of the occupier. Some people believe with Thoreau that "This curious world which we inhabit is more wonderful than it is convenient; more beautiful than it is useful; it is more to be admired than it is to be used." For them the expanding economy of the West must be diabolical indeed. Dry wells, polluted streams, eroded hillsides, and smog may be geologically superficial but nonetheless persuasive evidence that man's engineering abilities were given to him more abundantly than the wisdom to foresee their consequences, or the compassion willingly to abate their nuisances.

Under our system of living, people and their commodities and services are highly mobile. Consequently, in any general consideration of people and resources, no state or region can be a self-contained entity; rather, it is better to think at least in national terms, and even more ideally, in international terms.

Nationally, these are days of growing conscience and concern about resources. The constituting of the President's Materials Policy Commission in 1951 and its comprehensive reports were a major stride in giving effect to this concern. A second major stride was the organizing of the Ford Foundation's Resources for the Future, Inc., which sponsored the Mid-Century Conference on Resources for the Future last December (1953). To William Vogt and Fairfield Osborn these manifestations of concern must have been comforting.

The report of the President's Commission and of the Mid-Century Conference, together with other writings on contemporary problems of population and resources, strongly suggest that a stage has been reached at which broadscale soul-searching is called for. Perhaps this conclusion is no more than the myopic egocentricity that has led individuals of preceding generations to the conviction that their stage of development was somehow peculiarly epochal. Even after acknowledging and discounting this possibility, however, I am still convinced that, to rely on a badly eroded phrase, "a new turn of events is at hand." And it is not impossible, perhaps, that the years immediately ahead will have significance at least equal to the counterpart years of the Industrial Revolution.

Basically, the problem at hand is our unbalanced natural resource budget. Our standard of high living requires prodigious quantities of materials and energy. Furthermore, sustaining the ever-improving mate-

rial progress to which we are so deeply committed and this, for an expanding population, means rapidly accelerating demands for energy and materials. Except as the finiteness of the resource base is lifted or postponed by research or technology, the prospective relationship between resource demand and supply is more that of collision than of equilibrium.

These recent reports impress one of the exciting possibilities and potentialities for research and technology. It is not at all difficult to be persuaded that there will be substitutes for resources as we now know and use them, and also substitutes for the substitutes. But this has to be largely a matter of faith. And even those of great faith realize we are at the point where, more than ever before, human abilities for research and technological development have to be treated as a scarce resource to be developed and conserved accordingly.

Significantly, both the President's Commission and the Mid-Century Conference identified research and technology as an endogenous force capable of being shaped and manipulated by deliberate policies. The participants in Section VII of the Mid-Century Conference, in discussing resources research, dealt with two matters that are likely to become increasingly familiar to scientists in all fields—namely, organization and communication. These are problems that are exceedingly intricate and delicate. I mention them now, not in the hope of being informative with respect to their solutions, but only to say that, notwithstanding their acknowledged existence, I doubt that either those having an abiding faith in science and technology, or scientists and technologists themselves, fully appreciate the compelling importance of these problems or the imagination and forbearance it will take to solve them.

In closing, let me add another and important dimension to this last point. This is most readily done by quoting a paragraph of wisdom from one of the participants of the Mid-Century Conference—Stanley A. Cain of the University of Michigan:

Because man is the creator of culture and is at the same time its creature, the problems of resource use are only partially scientific and technological. They are also—perhaps largely—social, economic, and political problems. We cannot definitely realize particular research problems in the absence of the situation in which these problems are created and the answers that are obtained will be applied. Only a deeper and wider understanding of the nature of human ecological problems can bring about the necessary social and financial support for their prosecution and the needed wedding of physical and social fields of research. Here I find the greatest underdeveloped area in the national research program.

Without concurrent and integrated progress in this area of greatest underdevelopment, out of which man may gain a better understanding of himself in terms of his universe, it seems neither irresponsible nor sophistic to "view with alarm."

We presently face two potential juggernauts—population and technology. Conceivably, our technological future could go either to the extreme of being too successful or to that of niggardliness. At the first extreme, there is the danger that man's values may derive too largely from the beguilements of the advertiser; at the second extreme, they may be instilled by the despot thriving upon frustration and despair. At either extreme, or even at an intermediate course of development; confident living will require the deep-seated conservatism and humility with respect to himself that man will have only if he realizes and understands he is the creature as well as the creator of his culture. The conservatism that derives from this knowledge and understanding should be the way to avoid the pitfalls of endeavoring a too-thorough mastery of the universe. There is no compulsion for man, either by reason of his numbers or by reason of grasping for material comforts, to undertake to consume everything the planet has to offer and, in the meanwhile devote his outstanding capabilities to doing it faster and more thoroughly.